

Claims

[c1] I claim:

1. A microtube for surgery and dentistry, the microtube comprising:

a tubular member having anterior and posterior ends; an interior axial opening extending from the anterior to the posterior end of the tubular member; and a side port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to a site of a surgical or dental procedure, and for delivery to the site of a therapeutic agent to be used for the surgical or dental procedure.

[c2] 2. The microtube of claim 1, wherein the microtube has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns.

[c3] 3. The microtube of claim 1, further comprising:
a front port connected to the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to the site of the surgical or dental procedure, and for delivery to the site a therapeutic agent to be used for the surgical or dental procedure.

- [c4] 4. The microtube of claim 1, wherein the therapeutic agent is pressure.
- [c5] 5. The microtube of claim 1, wherein the therapeutic agent is vacuum.
- [c6] 6. The microtube of claim 1, wherein the therapeutic agent is a pharmaceutical agent.
- [c7] 7. A microtube for surgery and dentistry, the microtube comprising:
- a. a tubular member having anterior and posterior ends;
 - b. a port disposed at the anterior end of the tubular member; and
 - c. an inner core of a material capable of transmitting a laser beam, the inner core extending from the posterior end through the port at the anterior end of the tubular member.
- [c8] 8. The microtube of claim 7, wherein the port is a side port.
- [c9] 9. The microtube of claim 7, wherein the port is a front port.
- [c10] 10. A method for transmitting a therapeutic agent to a site of a surgical or dental procedure, the method comprising the steps of:

- a. providing a microtube comprising a tubular member having anterior and posterior ends; an interior axial opening extending from the anterior to the posterior end of the tubular member; and a side port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to the site of surgical or dental procedure, and for delivery to the site the therapeutic agent to be used for the surgical or dental procedure;
- b. connecting the side port of the tubular member to the site of the surgical or dental procedure;
- c. connecting the axial opening at the posterior end of the tubular member to the source of the therapeutic agent; and
- d. delivering the therapeutic agent to the site of the surgical or dental procedure.

[c11] 11. The method of claim 10, wherein the microtube has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns.

[c12] 12. The method of claim 10, further comprising the steps of

- e. providing a front port at the anterior end of the tubular member; and
- f. connecting the front port to the site of the surgical or

dental procedure.

- [c13] 13. The method of claim 10, wherein the therapeutic agent is vacuum.
- [c14] 14. The method of claim 10, wherein the therapeutic agent is a pharmaceutical agent.
- [c15] 15. The method of claim 10, wherein the therapeutic agent is pressure.
- [c16] 16. In a dental method for a root canal comprising drilling a tooth, mechanical canal debridement, and chemical canal debridement, the improvement comprising the steps of:
 - (a) providing a microtube comprising a tubular member having anterior and posterior ends, a port disposed at the anterior end of the tubular member, and an inner core of a material capable of transmitting a laser beam, the inner core extending from the posterior end through the port at the anterior end of the tubular member;
 - (b) disposing the port of the tubular member at the site of the root canal;
 - (c) disposing the axial opening at the posterior end of the tubular member at a source of the laser beam; and
 - (d) delivering the laser beam through the port of the tubular member to the site of the root canal,

thereby combining the mechanical canal debridement and the chemical canal debridement into a single procedure, enabling removal of pulpal tissue in three-dimensional volume elements which files and other instruments cannot reach, and sterilizing the canal and ablating the pulpal tissue.

- [c17] 17. The dental method of claim 16, further comprising the steps of:
- e. providing a microtube comprising a tubular member having anterior and posterior ends, an interior axial opening extending from the anterior to the posterior end of the tubular member; and a port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to the site of the surgical or dental procedure, and for delivery to the site the therapeutic agent to be used for the surgical or dental procedure; and
 - f. delivering through the port of the tubular member to the site of the dental procedure a sealant, thereby obturating the tooth at the site of the root canal.
- [c18] 18. The method of claim 17, wherein the port is a side port.
- [c19] 19. The method of claim 17, wherein the port is a front port.

[c20] 20. The method of claim 16, wherein the microtube has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns.

[c21] 21. The method of claim 17, wherein each microtube has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns.